BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local and Flexible Procurement Obligations for the 2019 and 2020 Compliance Years	Rulemaking 17-09-020 (Filed September 28, 2017)

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION TRACK 2 TESTIMONY

CORRECTED CHAPTER 4: SYSTEM RESOURCE ADEQUACY DEMAND FORECASTS

SPONSOR: Robert Emmert, Manager, Interconnection Resources[1]

Proposal No. 3: The Commission Should Adopt a 1-in-5 Year Demand Forecast During Months with the Highest Peak Demand Uncertainty

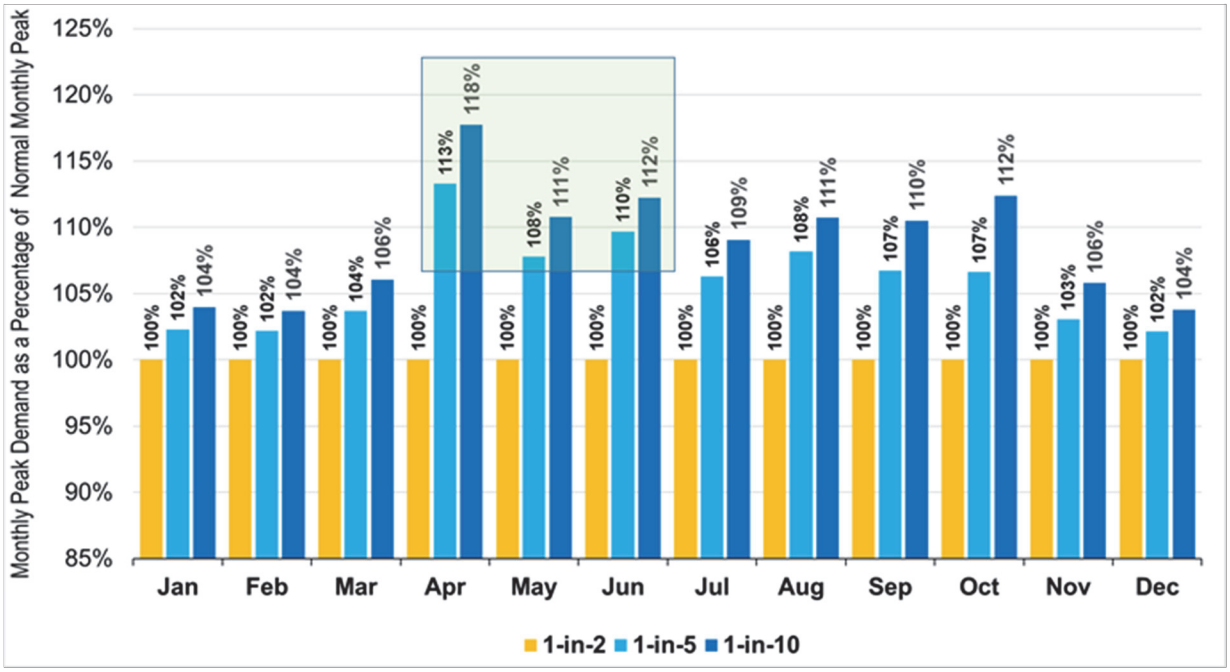
The California Independent System Operator Corporation (CAISO) proposes using a 1-in-5 peak demand forecast basis with the current planning reserve margin to set system resource adequacy requirements for April, May, and June, instead of the currently applicable 1-in-2 peak demand forecast. Changing the forecast demand basis better reflects the risk and operational challenges during the months with highest peak demand uncertainty, especially in the spring months when the weather can vary significantly before and during the transition into summer.

The current 1-in-2 peak demand forecast (*i.e.*, the average peak forecast) by definition overlooks the potential and actual occurrence of extreme variability in temperatures that can occur in the transition months. The CAISO analyzed 23 years of weather-driven historical demand[2] for all 12 months comparing 1-in-2, 1-in-5, and 1-in-10 demand levels. The CAISO determined the 1-in-5 and 1-in-10 monthly peak demand is relative to the 1-in-2 peak demand as illustrated in Figure 1. For simplicity, each monthly peak demand is normalized to the 1-in-2

[1] *See* Robert Emmert's statement of qualifications, attached hereto as Appendix A.
[2] Source: Itron's MetrixND platform, based on 23 years of historical weather data from 1995 through 2017 across 24 weather stations in California.

peak demand. The results of this analysis are included with this testimony as Appendix B and Appendix C, respectively.

Figure 1: Comparison of Normal Peak Demand to Above Normal Weather Peak Demand (peak demand normalized in 1-in-2, e.g., 1-in-2 equivalent to 100%)



The analysis shows that the peak demand during 1-in-5 weather conditions are significantly above normal weather peak demand from April through October – ranging between 106 to 113 percent higher. This demonstrates greater demand volatility within these months. The planning reserve margin accounts for some variability in demand, in addition to unplanned resource outages and other operational issues, but it does not account for this larger variability in demand above 1-in-2 peak levels. In other words, the current use of the 1-in-2 demand basis underestimates the potential demand in a way that decreases the effectiveness of the planning reserve margin. Although a case can be made to increase the underlying forecast for all months from April through October, the CAISO proposes to focus on April, May, and June because the greatest weather-driven demand variability occurs in these transition months. This is largely driven by increased variability in temperature as the season changes from spring to summer.

Appendix A

Statement of Qualifications

Robert Emmert, Manager, Interconnection Resources

Statement of Qualifications

Robert Emmert – Manager, Interconnection Resources, at the California ISO

Mr. Emmert has over 30 years' experience in the electric industry including generation interconnections; resource planning and load forecasting; renewable project development; power plant engineering; and natural gas supply and marketing.

Mr. Emmert's current responsibilities at the California ISO (CAISO) include:

- Managing the Interconnection Services process, including:
  - Ensuring the timely and accurate study of new energy resources through the ISO interconnection procedures.
  - Leading Interconnection stakeholder initiatives and policy development.
- Managing the Loads and Resources group, including:
  - The CAISO seasonal loads & resources assessments
  - Production cost modeling of reliability and renewable integration requirements
  - Mid-term load forecasting
  - NERC standards compliance
  - FERC and WECC reliability reporting and data submission requirements

Mr. Emmert received a Bachelor of Science in Mechanical Engineering from Oregon State University.

Appendix B

CAISO Monthly Peak Forecast Calculations

CAISO Monthly Peak Forecast (before adjustment)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1-in-2	30,625	29,772	29,160	30,928	37,287	40,466	44,182	44,870	42,530	34,364	30,230	32,120
1-in-5	31,115	30,215	30,036	34,810	39,919	44,090	46,640	48,213	45,083	36,392	30,948	32,589
1-in-10	31,416	30,460	30,517	35,927	40,762	44,814	47,543	49,027	46,369	38,107	31,552	32,887

Notes:

[1]: Based on historical peak load from Itron's MetrixND platform, using 23 years of historical weather data from 1995 through 2017 across 24 weather stations in California under 7 weather scenarios. Includes adjustment for pumping load.

[2]: 1-in-2 forecast calculated for each month based on the 50th percentile.

[3]: 1-in-5 forecast calculated for each month based on the 80th percentile.

[4]: 1-in-10 forecast calculated for each month based on the 90th percentile.

2018 Annual Peak Forecast

2018	Annual Peak	Ratio
1-in-2	46,625	1.04
1-in-5	48,636	1.05
1-in-10	51,632	1.05

Notes:

[1]: The 2018 Annual Peak Forecast for CAISO is derived from Itron's MetrixND platform (shown in first column).

[2]: CAISO calculates monthly results based on each individual month's weather.

Therefore the monthly data is then normalized to match with the annual peak forecast result.

The ratio for the 1-in-2 forecast is calculated as the the 2018 1-in-2 annual peak divided by the CAISO 1-in-2 August Peak Forecast (before adjustment).

The ratio for the 1-in-5 forecast is calculated as the average ratio of the 1-in-2 and 1-in-5 ratios.

The ratio for the 1-in-10 forecast is calculated as the the 2018 1-in-10 annual peak divided by the CAISO 1-in-10 August Peak Forecast (before adjustment).

CAISO Monthly Peak Forecast by the CAISO (after adjustment)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1-in-2	31,823	30,937	30,301	32,138	38,745	42,049	45,910	46,625	44,193	35,708	31,413	33,376
1-in-5	32,551	31,608	31,422	36,415	41,760	46,124	48,791	50,437	47,162	38,071	32,375	34,093
1-in-10	33,086	32,079	32,139	37,836	42,928	47,196	50,070	51,632	48,833	40,132	33,229	34,635

Notes:

[1]: 1-in-2 forecast adjusted by a ratio of 1.04.

[2]: 1-in-5 forecast adjusted by a ratio of 1.05.

[3]: 1-in-10 forecast adjusted by a ratio of 1.05.

Comparison of Normal Peak Demand to Above Normal Weather Peak Demand 1-in-2 Peak Demand Equivalent to 100%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1-in-2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
1-in-5	102%	102%	104%	113%	108%	110%	106%	108%	107%	107%	103%	102%
1-in-10	104%	104%	106%	118%	111%	112%	109%	111%	110%	112%	106%	104%

Notes:

[1]: 1-in-2 set to 100%.

[2]: 1-in-5 calucated as a ratio of the 1-in-5 forecast to the 1-in-2 forecast.

[3]: 1-in-10 calucated as a ratio of the 1-in-10 forecast to the 1-in-2 forecast.

Appendix C

CAISO Monthly Peak Forecast Data

Omitted as Attached Document – *See* Attached Excel File

(Served on all persons designated to receive service in Proceeding No. R.17-09-020.)